

Claims

1. An optical ring network structure comprising:

- two or more network elements, and
- a single optical fibre connection between each pair of neighbouring network elements for carrying an optical signal,

wherein the ring network structure is arranged in a manner such that, in use, band allocation utilising multiplexing on each single fibre connection is chosen in a manner such that groups of wavelengths for bi-directional data transfer and for bi-directional redundant data transfer for protection respectively are provided on each single fibre connection.

2. An optical ring network structure as claimed in claim 1, wherein the optical ring network structure comprises MUX/DEMUX means located at each network element for multiplexing and de-multiplexing the optical signal, depending on the propagation directions of the respective wavelengths in the optical signal with respect to the MUX/DEMUX means.

3. An optical ring network structure as claimed in claim 2, wherein the MUX/DEMUX means comprises a 3-port circulator disposed to combine counterpropagating traffic from a unidirectional multiplexer means and to a unidirectional de-multiplexer means of the MUX/DEMUX means.

4. An optical ring network structure as claimed in claim 2, wherein the MUX/DEMUX means comprises a bi-directional multiplexer/de-multiplexer means.

5. An optical ring network structure as claimed in any one of the preceding claims, wherein the MUX/DEMUX means comprises a dense WDM MUX/DEMUX and a coarse WDM MUX/DEMUX, wherein the coarse WDM MUX/DEMUX is disposed in a manner such that, in use, it drops and adds certain wavelength bands at the network element to and from the fibre connections to further demultiplexing and from multiplexing by the dense WDM MUX/DEMUX.

6. An optical ring network structure as claimed in any one of the preceding claims, wherein the optical ring network structure is arranged in a manner such that the data transfer and the redundant data transfer are transmitted concurrently.

7. An optical ring network structure as claimed in claim 6, wherein the ring network structure comprises means for selecting between receipt of either the data transfer or the redundant data transfer located at each network element.

8. An optical ring network structure as claimed in claim 7, wherein the means for selecting comprises a switch.

9. An optical ring network structure as claimed in claim 7, wherein the means for selecting comprises amplifiers for the received data transfer and the received redundant data transfer respectively.

10. An optical ring network structure as claimed in ~~any one of claims 1 to 5~~, wherein the optical ring network structure is arranged in a manner such that the redundant data transfer is transmitted only in response to a failure.

11. An optical ring network structure as claimed in claim 10, wherein the optical ring network structure is arranged in a manner such that preemptible data is being transmitted on the groups of wavelengths provided for the redundant data transfer when the optical ring network structure is in normal operation.

12. An optical ring network structure as claimed in ~~claims 10 or 11~~, wherein the system comprises switching means located at each network element for switching from data transfer to redundant data transfer.

13. An optical ring network structure as claimed in claim 12, wherein the switching means is disposed between the dense WDM MUX/DEMUX and the coarse WDM MUX/DEMUX.

14. An optical ring network structure as claimed in ~~any one of the preceding claims~~, wherein the propagation directions of alternating groups of wavelengths with respect to the ring network structure are opposed to one another.

15. An optical ring network structure as claimed in claim 14, wherein the groups of wavelengths each comprise a single transmission channel.

16. An optical ring network structure as claimed in claim 14, wherein each group of wavelengths comprises a band of transmission channels.

claim 1

17. An optical ring network structure as claimed in ~~any one of the preceding claims~~, wherein the optical ring network structure comprises two or more optical fibre connections between each pair of neighbouring network elements, wherein the ring network structure is arranged in a manner such that, in use, band allocation utilising multiplexing on each one of the single fibre connections between each of the pairs is chosen in a manner such that groups of wavelengths for bi-directional data transfer and for bi-directional redundant data transfer for protection respectively are provided on each single fibre connection.

18. A method of distributing data on a optical ring network structure, the optical ring network structure comprising two or more network elements, the method comprising the step of:

- distributing a bi-directional multiplexed optical signal on single optical fibre connections between each pair of neighbouring network elements,

wherein band allocation utilising multiplexing on each single fibre connection is performed in a manner such that groups of wavelengths for bi-directional data transfer and for bi-directional redundant data transfer for protection respectively are provided on each single fibre connection.